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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,613	12/05/2003	Naoyuki Takahashi	31721-198597	9104

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EXAMINER
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SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/727,613	<b>Applicant(s)</b> TAKAHASHI ET AL.	
	<b>Examiner</b> Matthew J. Song	<b>Art Unit</b> 1722	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12/5/2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-17 and 19-22 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/5/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 8, 13, 14, 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al (US 5,879,811).

Tanaka et al discloses a method of forming a thin film comprising an oxide single crystal having a quartz crystal structure, this reads on applicant's epitaxial film, (col 2, ln 10-62) on a single crystal substrate of an oxide, such as quartz, sapphire (col 5, ln 10-20) or a silicon single crystal substrate (Examples 6-7). Tanaka et al also discloses a vapor phase deposition for producing an silicon dioxide thin film having a quartz crystal structure at atmospheric pressure using metal alkoxides, such as,  $\text{Si}(\text{OCH}_3)_4$ ,  $\text{Si}(\text{OCH}_3)_4$  or  $\text{Si}(\text{OC}_3\text{H}_7)_4$  (col 7, ln 1-65), where these metal alkoxides read on applicant's tetramethoxysilane, tetraethoxysilane and tetrapropoxysilane, respectively. Tanaka et al also discloses the raw material gas must be mixed with oxidizing gas, such as oxygen, this reads on applicant's reacting the source of silicon with oxygen to deposit a quartz film on the substrate.

Referring to claim 13, Tanaka et al discloses depositing quartz.

Referring to claim 14, Tanaka et al discloses a sapphire substrate (col 5, ln 1-20).

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Referring to claim 17, Tanaka et al discloses a X ray diffraction profile exhibiting a diffraction peak at  $2\theta=50.6^\circ$  in Fig 1, Fig 4 and Fig 5 for quartz.

Referring to claim 19, Tanaka et al discloses using an inert gas to dilute the mixed gas, this reads on applicant's inert carrier gas.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 12, 15, 16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811).

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Tanaka et al discloses all of the limitations of claims 12, 15,16 and 20 as discussed previously, except Tanaka et al does not teach the claimed deposition rate, temperature of silicon, the deposition temperature and partial pressure.

Deposition rate is a result effective variable that can be controlled with source gas flow rate, temperature, and pressure. Temperature and partial pressure is a well known result effective variable. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tanaka et al to obtain the claimed deposition rate, the claimed temperatures, and claimed partial pressure by conducting routine experimentation of a result effective variable (MPEP 2144.05).

5. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811) as applied to claim 8 above, and further in view of Yamazaki et al (US 2005/01589041 A1).

Tanaka et al discloses all of the limitations of claim 9, as discussed previously, except using a catalyst.

In a method of depositing silicon oxide, note entire reference, Yamazaki et al teaches a silicon oxide film is formed using low pressure CVD, and adding hydrogen chloride, this reads on applicant's catalyst, note claim 10, to the mixed raw material gas ([0030]). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tanaka et al by adding hydrogen chloride to the atmosphere as taught by Yamazaki et al to prevent sodium contamination ([0031]).

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6. Claims 11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811), as applied to claim 8 above, and further in view of Okano et al (JP 08-110425), an English abstract is provided in the IDS filed 12/5/03, or in view of Tokunaga et al (JP 05-215929), an English abstract is provided in the IDS filed 12/5/03.

Tanaka et al teaches all of the limitations of claim 11, as discussed previously, except Tanaka et al does not teach a buffer layer.

In a method of forming a optical wave guide, Okano et al teaches a buffer layer 21 is formed on the surface of a Si substrate and a quartz glass film composed of the same composition as the buffer layer is further form on the quartz film (abstract). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tanaka et al with Okano et al's quartz buffer because warpage is reduced.

In a method of forming a glass waveguide, Tokunaga et al teaches a buffer layer 2 of quartz is formed on a substrate and a pure quartz film 3 is formed on the buffer layer (abstract). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tanaka et al with Tokunaga et al's buffer layer of quartz to form a glass waveguide with a small transmission loss.

7. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811) in view of Okano et al (JP 08-110425), an English abstract is provided in the IDS filed 12/5/03, or in view of Tokunaga et al (JP 05-215929), an English abstract is provided in the IDS filed 12/5/03, as applied to claims 11 and 21 above, and further in view of Ohtani et al (US 5,904,770).

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The combination of Tanaka et al and Okano et al or the combination of Tanaka et al and Tokunaga et al teaches all of the limitations of claim 22, as discussed previously, except annealing the film.

In a method of forming a silicon oxide film, note entire reference, Ohtani et al teaches annealing a silicon oxide film, formed by CVD using TEOS and ozone, in oxygen or ozone in a temperature range from 400-600°C for a duration of 30-60 minutes (col 8, ln 1-65). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tanaka et al and Okano et al or the combination of Tanaka et al and Tokunaga et al by annealing the film, as taught by Ohtani et al, to improve film quality.

#### ***Allowable Subject Matter***

8. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art, Tanaka et al (US 5,879,811) teaches forming a quartz film using TEOS and oxygen gases in a normal pressure CVD process. Tanaka et al does not teach or suggest using a GaN or ZnO buffer layer. The use of a buffer layer with a lattice constant unlike quartz would not have been obvious to person of ordinary skill in the art at the time of the invention.

#### ***Conclusion***

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10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Abe (US 5,146,082) teaches forming quartz using a plasma CVD and tetraethoxysilane, tetramethoxysilane, oxygen, ozone or carbon dioxide as material gases (col 21, ln 1-25).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew J Song  
Examiner  
Art Unit 1722

MJS  
January 8, 2006

DUANE SMITH  
PRIMARY EXAMINER  
1-9-05